Shop Lab Activities Workbook

Change a tire

Jump start (Boost) a dead battery

Check Engine Oil

Dry wall anchor

Splice a wire and test continuity

Changing an Automobile Tire

Often times vehicle and trailer tires go flat at the worst times possible. Having the skills to change a tire can get you back on the road very quickly.

WARNING:

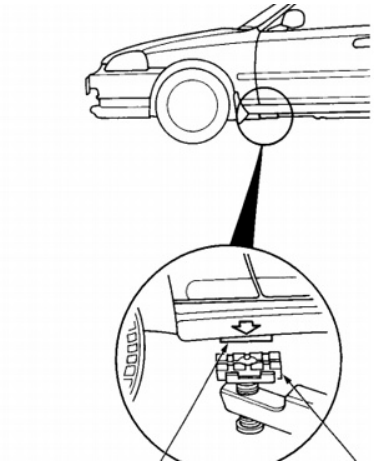
Only change a tire in low traffic areas. Many individuals have been injured or killed by passing cars, when changing a tire on the side of the road. In some instances, it is better to damage the rim and tire driving away from the road, than trying to make this repair roadside.

Be sure the vehicle is NOT on a steep incline. An unlevel jack can slip, and the vehicle can trap or pin an unaware individual.

Procedures:

1) Be sure the vehicle is on level ground, and a safe distance from the road and passing vehicles.
2) Turn off the vehicle, engage the parking brake, and activate the hazard lights.
3) If on a slight incline, block the diagonally opposite tire.
4) Locate the jack, spare tire, and tire changing tool.
5) Using the tire tool, loosen the lug nuts while the flat tire is still contacting the ground. The weight of the car will apply pressure to the tire, and keep the wheel from spinning.
6) Identify the correct point to place the jack. This may be the pinch well, the axle or the subframe.
7) Jack the vehicle up high enough to remove the tire. Use caution as the weight of the vehicle rests solely on the jack.
8) Remove the lug nuts, and place in one pile.
9) Remove the flat tire. If the tire is stubborn, carefully back kicking the tire with your heal will loosen it. Be careful as this can rock the car from the jack.
10) Install the inflated spare tire, and hand tighten the lug nuts to hold the wheel in place. Be sure that the wheel is centered on the hub.
11) Carefully lower the jack.
12) With weight applying pressure on the car, tighten the lug nuts in a star pattern (Fig 2.)
13) Load all tools and the flat tire into the car, and drive to the nearest service station to have them torque your lug nuts, and repair your tire.

Figure 1. Jack Placement



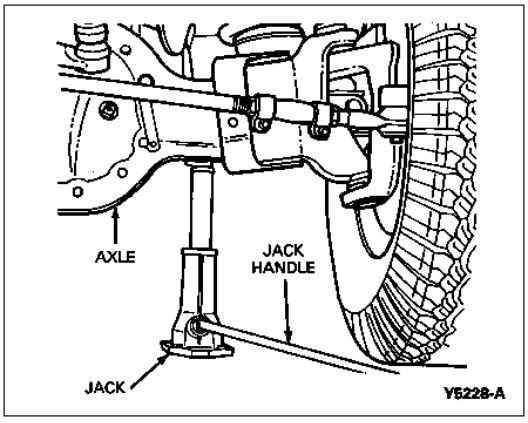
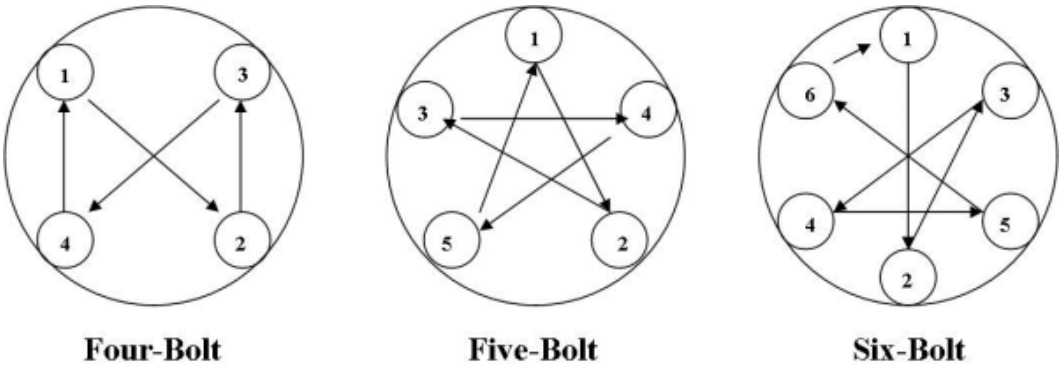


Figure 2. Tightening Bolt Patterns



Jump Starting (Boosting) a Weak Battery

Dead or weak batteries are often caused by leaving headlights on or cold weather, requiring high amperage. Jumping (Boosting) a battery is one way to solve this problem.

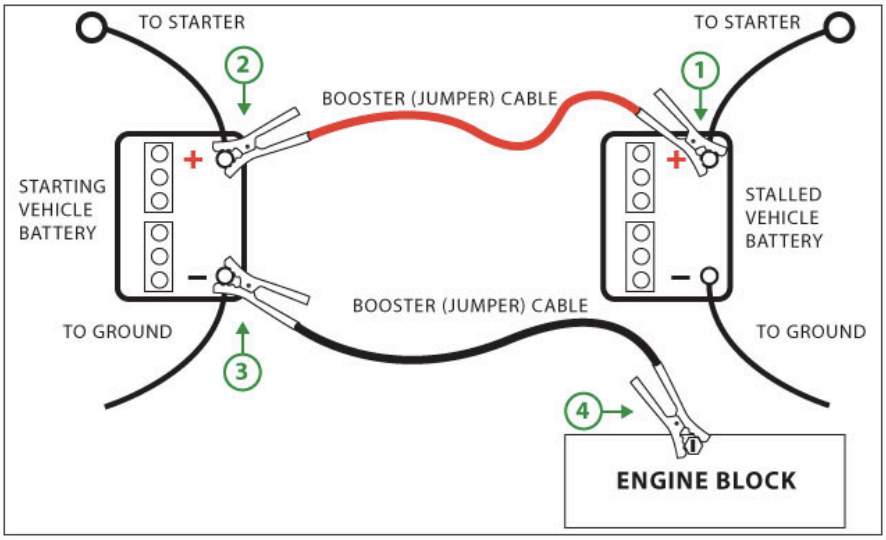
Portable booster packs can be used in place of jumper cables. Jumper packs eliminate the need for a second car in the procedures.

WARNINGS:
If your battery is damaged or leaking DO NOT attempt to jump start the vehicle. Battery acid is corrosive and flammable and can cause injury.

Wear safety glasses at all times when jumping a battery.

Procedures:

1) Park both vehicles next to each other so that they are close enough for the jumper cables to reach. .
2) Open the vehicle hoods, and identify the location of the battery. On some vehicles, the battery is located in the trunk, but jumper terminals should be mounted under the hood.
3) Connect the first end of the RED positive lead to the positive terminal on the working battery. Do the same for the other end of the lead for the weak battery.
4) Connect the BLACK negative lead to the negative terminal on the working battery. Attach the other end to a metal (grounding) point, such as a bolt or bracket, away from the dead battery. In some instances negative pole to negative pole connection is acceptable.
5) Check that the leads are away from moving parts, then start the engine of the working car.
6) After about a minute, try starting the car with the dead battery. If the vehicle does not start, leave the battery charging for a couple more minutes
7) Once the car with the dead battery has started, carefully remove the jumper cables in the reverse order which you attached them. Be cautious of moving parts in the engine bay.
8) Leave the vehicle with the weak battery running, and drive it a short distance in order for the alternator to charge the battery.
9) If boosting the battery does not start the vehicle, battery replacement may be necessary.



Checking Your Engine Oil

Metal internal engine components constantly rub on one another, causing friction. Oil is used to lubricate these parts, and prevent wear. An engine with low oil will not provide the proper lubrication these components.

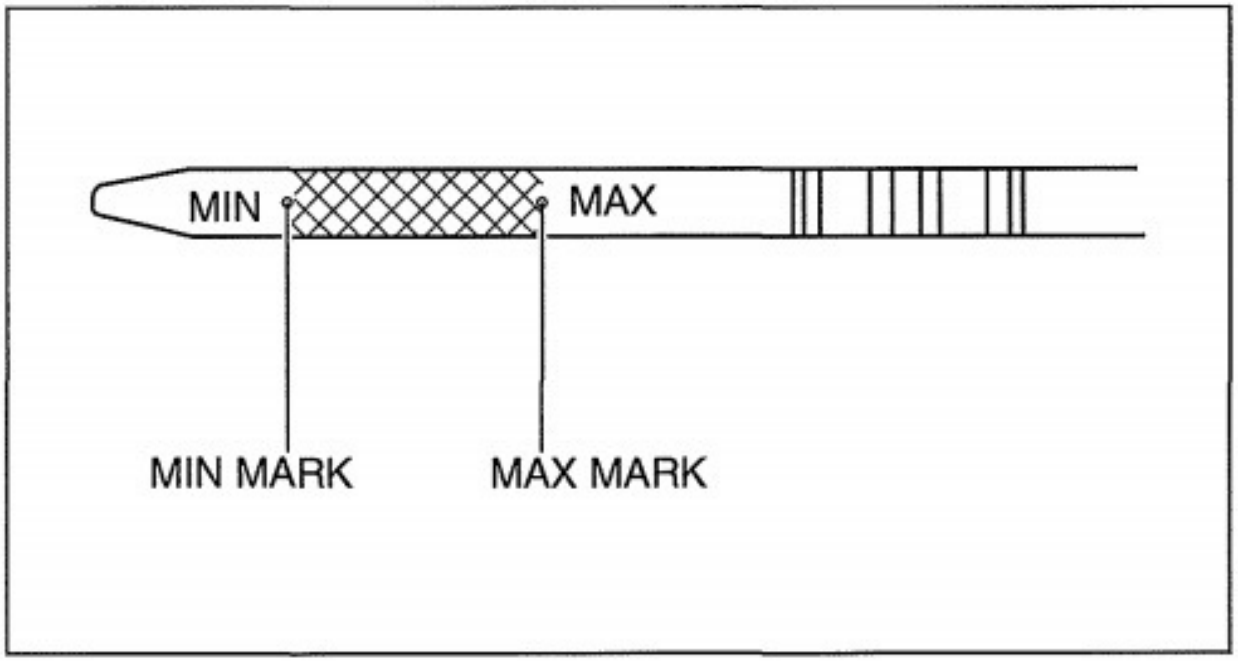
WARNINGS:

Always wear safety glasses.

In the state of California, petroleum products are known to cause cancer.

Procedures:

1) Make sure the car is parked on level ground. This will ensure an accurate oil measurement.
2) Be sure the engine is off, and the oil has had time to drain down into the oil pan.
3) Open the car's hood and locate the dipstick. ENGINE OIL should be printed on the dipstick handle.
4) Withdrawal the dipstick from the engine and, using a rag, wipe any oil off from its end. Then insert the dipstick back into its tube, pushing it all the way in.
5) Withdrawal the dipstick again, and read the oil level. Every dipstick has some way of indicating the proper oil level, whether it be two pinholes, the letters L and H (low and high), the words MIN and MAX, or simply an area of crosshatching. Refer to the owner's manual, if necessary. If the top of the oil is between the two marks or within the crosshatched area, the oil level is adequate.
6) If the engine oil level is below the minimum mark, you need to add oil.
7) If the oil level is within range, wipe off the dipstick again and insert it back into its tube, making sure it's fully seated.



Dry Wall Anchor

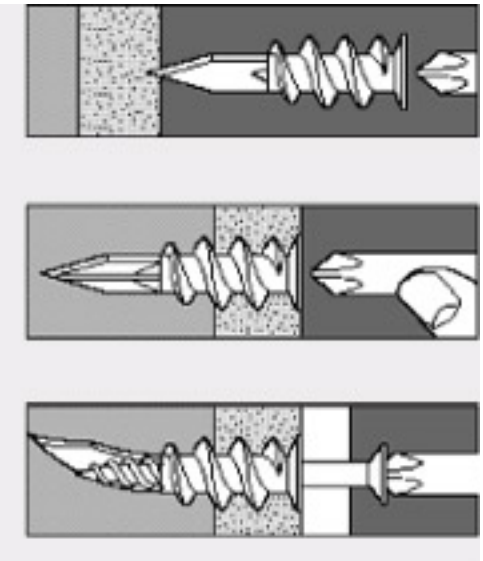
Dry wall anchors are used to fasten screws into drywall or sheetrock. These anchors allow screws to be fastened at any point on the wall.

WARNINGS:

Wear safety glasses at all times when preforming work with hand tools.

Procedures:

1) Identify the point at which the anchor should be inserted into the wall. **Note that this type of anchor cannot be used over a stud.
2) Press the tip of the anchor into the drywall, using a #2 Phillips head screwdriver. If the paint finish is thick, punching a small divot with a nail will help guide the anchor.
3) Turn the anchor clockwise into the drywall, until the head of the anchor is flush with the drywall. **Do not over tighten the drywall anchor, and it will strip.
4) Insert the screw into the anchor, and turn it clockwise until the screw is at the desired depth.



Splice and Crimp Braided Wire

Occasionally wire becomes frayed, broken, or cut in order to make a repair. Reconnecting the wire is called splicing. There are many connection types. The most popular is called a compression crimp union.

WARNINGS:

Always wear safety glasses when splicing and crimping wire.

Procedures:

1) Identify the size wire that is being crimped.
2) Locate a wire stripping and crimping tool.
3) Remove ½" to ¾ " of insulation from the wire end to be spliced.
4) Using your fingers, gently roll the end of the wires together in order to reestablish a braid.
5) Insert the wire end into the crimp. Using the crimpers, clamp the splice. Check that the wire is securely crimped.
6) Repeat procedure #5 with the additional wire end to be spliced.
7) Check for continuity by testing the electrical circuit.